

Chapter 2

Approaches and Interests of Ethnobotanical Research

Traditionally ethnobotanists around the world have been engaged in recording plants and the ways they are used by human populations (including therapeutic forms in the case of medicinal plants). This type of procedure has provided enormous progress in basic and applied research in the phytochemical and pharmacological fields, since ethnobotanists provided the resources for researchers in related fields and the set of data required for the intended analysis. In practice, the study of the interrelations between cultures and plants has received this kind of treatment. However, as already noted, the scenario has changed completely, and today we are interested in understanding additional aspects of these relations (see Pieroni et al. 2004; Vandebroek and Balick 2012; Reyes-García et al. 2013; Wolverton 2013; Wolverton et al. 2014). For example, what happens to the botanical knowledge of a cultural group when it migrates to other regions of its country or even to other countries? How does the knowledge of plant resources change in relation to socioeconomic variables (such as gender and age)? What can explain this variation? Who are the members of the community more likely to spread new information about useful plants or to have their information assimilated by the community? (Box 2.1, Fig. 2.1)

Box 2.1: Intercultural Variation on the Traditional Botanical Knowledge

It has long been understood that the traditional knowledge of useful plants is not distributed evenly among the members of a community. There are people who know more about useful plants than others do and, for a particular domain (e.g., medicinal plants) it is possible that, even for individuals knowing about a similar number of plants, the repertoire of known species may be very different from one person to another.

What causes this heterogeneity in the traditional knowledge within a community? Some socioeconomic factors have shown to interfere significantly with the knowledge of useful plants. In this sense, the book *Introduction to Ethnobiology* (Albuquerque and Alves 2016) includes seven chapters that list factors responsible for the differences in traditional ecological knowledge, and the majority of the examples cited in the book are about plants.

Most studies on socioeconomic factors that interfere with traditional knowledge were concerned with medicinal plants; however, it is also possible to find works that cover general purposes, food plants, or timber uses.

Some of the most commonly studied factors are gender, age, and income (other factors can be found in Albuquerque and Alves 2016). The differences in social roles of men and women in different communities around the world often lead to certain specialization and differentiation in the body of knowledge acquired, for example, on medicinal plants. A meta-analysis by Torres-Avilez et al. (2016) on the effect of gender on the number of plants known as medicinal revealed that there is not an overall pattern of greater knowledge by men or women. However, it is possible to detect some differences according to the country where the research was conducted. In Brazil, for example, the majority of studies point to women as the greatest knowledge holders in the number of medicinal plants, but in Ethiopia, most of the evaluated studies show men as greater knowledge holders.

Many studies have also shown that the older the people are, the greater the number of useful plants they know. Some researchers tend to attribute this result to a process of acculturation or loss of interest of young people for local ecological knowledge. However, in a certain way, it is expected that the elderly have been able to accumulate more knowledge throughout their lives, so that the lesser knowledge on plants from the younger generations may merely be a product of their stage in the learning process. Therefore, we should not use the number of plants known as an indicator of disinterest and loss of knowledge among young people.

Regarding income, studies with different categories of plant use have shown that lower income increases dependence upon and knowledge of plant resources. In a community, we can find, for example, people with higher income who can buy bottled gas and therefore consume less firewood, while there may also be people of lower income who cannot afford to buy cooking gas often, thus consuming more firewood. In these cases, the relationship between the use and knowledge is quite intimate, given that a greater consumption and contact with certain plants typically also lead to a better understanding of them.



Fig. 2.1 People interact with plants in different ways, such as plant harvesting them to feed domestic animals. Credits: Flávia Santoro

The wide range of ethnobotanical research allows us to delineate a framework that, if not completely conceptual, is at least somewhat practical, as presented in the second edition of this work. To discuss this situation, we will adopt a classification that, we want to make it clear, is just practice. According to the methods employed and the epistemological orientation, the research can be qualitative or quantitative. The adoption of these terms has, above all, a didactic purpose, but that in no way serves to qualify any one approach as better than another. What makes a study serious is the rigor and quality with which a scientific problem is addressed.

In the qualitative approach, there is a concern to clarify how the culture in question understands and interprets the plant domain, what the nature of this relationship is, and what levels it reaches. There is the search for a deeper understanding of aspects of people-plant relations through participant observation and development of commonly open interviews. We can illustrate this approach with the case of the indigenous people Kayapo, from the village Gorotire, in southern Para (Brazil). Anthony Anderson and Darrell Posey found that the Kayapo have a harmonious system of management and interaction with the environment, and their system employs simple practices with an environmental conception very different from our own conception. They grow many varieties of plants apparently without harming the ecosystem. Currently, there is a great interest in research that takes into account this ecological dimension, so that the so-called “civilized” people could learn from the so-called “primitive” people to conserve and manage their natural resources. The study of the horticultural techniques and traditional agriculture has occupied many ethnobotanists, who see these as alternatives to the environmentally aggressive

“Western” techniques. The indigenous people, or the farmer, knowing their environment, appear to employ traditional techniques that harmonize the need for management and conservation of resources. However, this is not always true. It is a mistake to sustain the belief that all the so-called traditional cultures have harmonious relationships with nature, because there are studies that definitely suggest the opposite.

We can also focus on the role that a particular plant exerts in a culture. Let us take the case of the “African oil palm” (*Elaeis guineensis* Jacq.) used in the African-Brazilian cults. The ethnographer Raul Lody emphasizes that, in addition to the multiple uses and meanings, the palm oil is a symbol of the religious life in the *terreiros*. The act of preparing the food offered to the orishas with the palm oil is intended to unite the participants to the deities in the act of communal repast. In public festivals in the *terreiros*, such as in Olubajé, it is above all a strongly socializing act, reinforcing beliefs and ethical standards. Other plants in the African-Brazilian religions play important roles, which construct the identity of the believer, especially in initiation rites, where the use of plants is essential.

Another type of treatment that sometimes appears as qualitative is the interpretation of historical documents on the use of plants (usually medicinal plants) of past centuries, one of the occupations of historical ethnobotany. Historical ethnobotany is a relatively new approach that has gained a strong impulse and recent systematization. Some very good examples of this approach can be found in the publications of Dr. Alain Touwaide, many of them about the use and prescription of herbal medicine in the past. Historical ethnobotany usually comprises case studies, i.e., works that deal with particular social and historical contexts (see Pardo-de-Santayana et al. 2006). Historical ethnobotany can also clarify the role of certain plants from documentary sources. We can cite the case of “jurema.” This vernacular of many meanings is derived from the Tupi “Yu-rema,” a name that collectively includes plants in the backlands of the northeastern Brazil and the cult of jurema practiced by indigenous people in northeast Brazil and in some African-Brazilian tribes. Although the ritual structure reveals differences between the groups above, it is common to find the use of a liquid concoction prepared with the plant to which hallucinogenic properties are attributed. Researchers José M.T. de Andrade and Ming Anthony (1994) report that in the first phase of colonization there was no documentation of plant use, due to foreign settlers’ lack of interest along with the resistance of the natives for this task of documentation. In another phase, the documentation began, but for the purpose of repressing practices with the plant. However, “jurema” also served the interest of the colonizers, who tolerated its use when they integrated the indigenous people to their war lines in colonial Brazil, since they became stronger and more willing after ingesting a liquid concoction made from the plant.

Some scientists argue that the qualitative treatment, although valuable, has limitations when it intends to make generalizations that are more robust. Over time, or rather, more recently, works with different methodological proposals lent a new vision to the problem, and by making use of quantitative tools, ethnobotany gained a new direction along with the usual compilations and plants listings. From the 1990s it began to represent a growing share of publications particularly from the application of quantitative techniques for direct analysis of data on the use of plants (Phillips and Gentry 1993a, b) (Box 2.2).

Box 2.2: Quantification in Ethnobotany and Hypothesis Testing

The first attempts to use quantitative tools in ethnobotanical studies aimed to test hypotheses to allow a theoretical advance of the discipline. However, the theoretical issues do not appear to have been the focus of subsequent publications. Ramos et al. (2012) investigated the citation performance of two highly popular articles in ethnobotany, important from both the theoretical and methodological point of views. The first article selected was Phillips and Gentry (1993a, b), in which the authors proposed a quantitative tool (use value index) to test hypotheses related to the use of plants by people in the Department of Madre de Dios, Peru. The main intention of the authors reinforced the need for hypotheses in the theoretical development of ethnobotany. Bennett and Prance (2000) was the second selected article, and the authors presented the relative importance index to estimate the importance of plants introduced in human groups in order to understand the reasons why the exotic plants are present in several human pharmacopoeia.

Ramos et al. analyzed a set of articles that were published after Phillips and Gentry (1993a, b) and Bennett and Prance (2000) that cited these two popular references. The authors classified the set of articles in three categories of citation by relevance levels. The most relevant citations were those that took into account the main idea of Phillips and Gentry (1993a, b) or Bennett and Prance (2000), that is, the theoretical issues in those references. Citations of intermediate relevance highlighted the indices produced by these works, but did not mention the theoretical issues. Citations of low relevance were those that did not mention the main idea (theoretical issues) and the indexes developed, which are related to the methodological advancement of the two references.

In the results, the authors found that most of the articles evaluated presented citations of lower relevance (42.3% of the articles that cited Phillips and Gentry (1993a, b) and 56.5% of the articles that cited Bennett and Prance (2000)), followed by articles that presented citations of intermediate relevance, mentioning or using the indexes developed by the references (28.7% of the articles that cited Phillips and Gentry (1993a, b) and 38.5% of the articles that cited Bennett and Prance (2000)). There were few works that highlighted the theoretical contributions of the references, comprising only 14.8% of the works that cited Phillips and Gentry (1993a, b) and 19.2% of the works that cited Bennett and Prance (2000). For Ramos et al. (2012), two explanations are possible for these findings: that the authors of the work superficially read the two sources, or that authors did not read those sources. These data are surprising since they show that only a small portion of the works that cited the two selected references were interested in highlighting the theoretical issues produced. This may suggest that the development of quantitative tools does not seem to have been accompanied by an advancement in hypotheses testing, which is important for the theoretical development of the discipline.

The application of quantitative techniques provided important contributions to ethnobotany, enabling comparisons between plants to what concerns their cultural significance and evaluations of this significance for a particular human group, as well as providing data for the conservation of natural resources. We believe that, in practice, the union of qualitative and quantitative approaches will bring greater benefits to ethnobotany, determining a rapid progress of more efficient methods and techniques. Currently, there are several established criteria for quantitative analysis, with a considerable number of publications that propose them.

Let us start from the following example: a certain ethnobotanist, investigating the use of plants by a certain group, found that the plant known by the ethnic denomination X was, for a number of reasons, the most known and constantly mentioned. After applying mathematical models, he concluded that X is more significant for having many applications in everyday life. Asked by other experts as the reason for his statement, he stated categorically, “it is the most significant because the tests prove it to be so.” However, as his own answer did not satisfy him, he decided to continue the research. After exhaustive talks with his informants and having shared occasional experiences, he found that plant X appeared to be related to the mythology of the people. Through the collection of oral texts, he noted that this plant plays an important role in the culture and that it had been planted in the earth by a god of war for use by the community, according to their views. This example illustrates the fact that the numbers tell nothing without a proper interpretative context. In this sense, the union of qualitative and quantitative approaches is important to understanding the phenomena studied in ethnobotany.

Many plants play important roles in different human groups. Gonçalves de Lima (1975) points out that plants that mitigate thirst played great function for certain ethnic groups. The use of bromeliads (a family of plants commonly known as “gravatá” in some regions of Brazil) by indigenous groups as plants intended for relieving thirst is very common in South America. Such plants, due to the peculiar arrangement of leaves in rosettes, are capable of storing water, consequently allowing the formation of micro-habitats which are occupied by insects and reptiles.

Even in the rainforest in the Northeastern (Brazil), the hunters often serve themselves from water of stored by gravatás, and to drink them, use as pipettes straws made of “taquari” (Panicum spp.), suctioning, thus, a clear and limpid liquid, that we also had the opportunity to observe. The importance of this plant resource must have been extraordinary for Gê and Cariri in their expeditions across the vast territory of the hinterland, as was the “ravenala” in Madagascar (Ravenala madagascariensis), also called “traveler tree,” which accumulates as the gravatá in their leaf sheaths, enough water to provide thirst relief (Gonçalves de Lima 1975).

It is expected that certain plants will be culturally significant in a given context. Some ethnobotanical investigations have been carried out to precisely estimate the **cultural significance** of a plant, that is, the importance a plant has in a culture. In some ethnobotanical inventories, the study of cultural significance appears to be very helpful, providing objective parameters as a source of interpretation. The first quantitative model evaluating cultural significance was developed by Nancy Turner (1988), who studied indigenous groups in North America. Subsequently, the model has undergone some modifications by Stoffle et al. (1990), who made substantial changes to some aspects criticized and considered fragile in Turner’s model. However, many considerations about these models should be discussed, mainly concerning an accurate understanding of the term “**cultural significance**” (Box 2.3, Fig. 2.2).

Box 2.3: Analysis and Evaluation of Cultural Significance: The Case of Cultural Keystone Species

Some plants may be more important than others for a given culture. Among important plants, some may stand out in such a way that is essential to the structure and function of social-ecological systems, being named cultural keystone species (CKS) (see Platten and Henfrey 2009). Scientists have attempted to identify these species using a selected set of indicators. However, it has been a great challenge to define these species in a cultural system. Some of the criticisms indicate that (1) the distinction between cultural keystone species and species that are only important culturally and economically has not been clearly established, (2) the selected indicators need to be contextualized in social-ecological systems that are studied (Platten and Henfrey 2009), and (3) the indicators used to identify CKS should also include an emic perspective (Sousa 2014).

In order to answer some of the criticisms, Sousa (2014) sought to identify the cultural keystone species of two local communities located adjacent to Araripe National Forest in northeastern Brazil, aiming, for example, to distinguish the cultural keystone species from other locally important species. The author has used the perspective of local residents to separate species that are potentially keystones, interpreted as being essentially important according to the residents, and species that are important to people, but are not essential to them (and are not necessarily keystone species).

It was observed in the two communities that there is a clear separation between the species that are CKS and those that are culturally important species, but are not keystones. In addition, there was no clear difference between species of economic importance and cultural keystone species. According to Sousa (2014), this can be explained by the extraction profile of the communities studied, where species important for the local economy tend to be critically important to the residents. For example, for the two communities studied, the species *Caryocar coriaceum* Wittm. was considered a cultural key species and is a highly economically important species in the region. The *Attalea speciosa* Mart. ex Spreng. species was considered a cultural keystone species in one of the communities and has a high economic importance to the community. In this sense, for extractive communities, economic factors may make it important to structure social-ecological systems around certain species to the detriment of others, leading to the formation of cultural keystone species.

It must be said that not all the plants used for the greatest number of uses (medicine, food, construction, etc.) will be the most important for a society. Moreover, it is not possible to say a priori that some uses are more important than others from the cultural point of view. We need to investigate the context of the plant and its uses. Certain ritualistic situations require the immolation of animals in order to receive divine intervention required for a good harvest and efficacy of medicines,



Fig. 2.2 Plants, whether cultivated or spontaneous, acquire a great importance to some cultures. Maize, for example, is a plant of great cultural relevance to different populations. Credits: Margarita Paloma Cruz

for example. The same is true for some plants that, although they do not have many applications in certain cultural realities, are structuring and maintaining a social order and an “ethos,” that is, are necessary for the life of a people both in biological and social aspects, and are recognized as important for those who use them. “Ethos” in a people is understood as

the tone, character, and quality of their life, its moral and aesthetic style and mood—and their world view—the picture they have of the way things in sheer actuality are, their most comprehensive ideas of order (Geertz 1973).

All explained, we insist on saying that quantitative approaches brought a considerable advance to ethnobotany. However, without the guiding force of extremism, research is primarily directed by the goals and limitations of researcher. These limitations are easily overcome when the researcher establishes cooperative efforts, gaining a team of interested professionals from other areas. We can now summarize, in general terms, the characteristic approach of some current lines of research in ethnobotany, according to its thematic interest:

- Origin, domestication, and conservation of cultivated and wild plants
- Traditional agricultures (horticultural techniques, farm managements, diseases, pests, etc.)
- Traditional markets (where there is a perfect convergence of folk botany with plant products, and the dissemination of this knowledge can be verified)



Fig. 2.3 Humans collect a wide variety of natural products in different parts of the world. In the photos above, we have the fruits of pequi, which are of great economic and cultural importance in Chapada do Araripe, Ceara State, NE Brazil. Credits: Rafael Silva

- Ethnobotanical inventories in general (magical, medicinal, food, hallucinogenic, fuel plants, etc., used by human populations)
- Botanical folk taxonomies (these will be discussed later)
- History (historical ethnobotany)
- Use, perception, and manipulation of plant resources (we include here the plant domestication studies)
- Extraction of plant resources and its implications for biodiversity conservation
- Factors that affect the knowledge, use, and preference of resources by human populations
- Local criteria for the selection and use of plant resources by human populations (Fig. 2.3)

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